SEPTEMBER 1967

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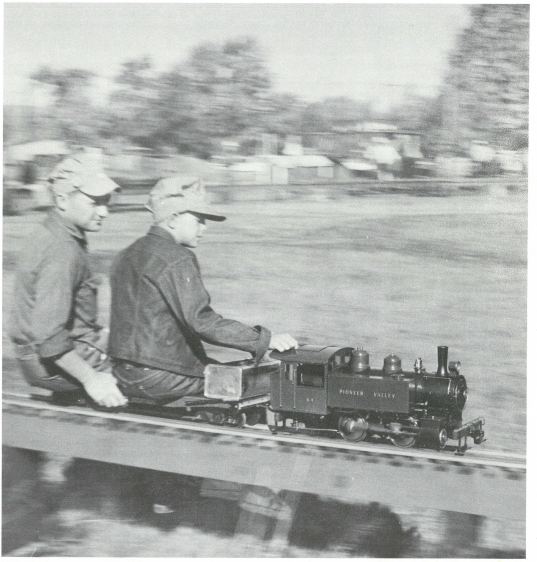
Live Steam



WM. C. FITT

Live Steam magazine

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. . . from the cupola

COVER PHOTO. A load of 512 scale tons is no greater effort for this 3½" scale 0-4-0 than it would have been for its prototype as pointed out in Fred Kiesel's article on the "Mathematical Aspects of Scale and Gauge." Sam Bassin (left) teaches Paul Fitt the fine points in operation of Sam's newly acquired locomotive.

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by George F. Kiesel, Jr.
Wabash, Frisco & Pacific Association

The choice of scale and gauge is one that seems to bother every model railroader from the man who, in "N" gauge, can get an empire on a tabletop to the 15" gauge Romney, Hythe, and Dymchurch, which is a common carrier. The decision is concerned with weight (is it too heavy for me to lift?); area (do I have enough room?); and linear dimension (can my lathe handle the parts?).

The problem also concerns your own circumstances, such as the presence of a local club track; whether you wish to build your own track and the amount of land you can use for this purpose; and the availability of supplies such as castings; and always with the cost.

To assist in making the choice easier for those who might be planning to build in a new gauge or are just entering the hobby, this article will examine the physical factors which influence the model, and over which the modelmaker has little or no control.

Mathematical

First, let us consider linear dimensions. When you build a model, everything you make is going to have anywhere from a hundred to several thousand measurements. These will have to be measured with conventional measuring instruments. Practically all machine shop scales are calibrated in sixty-fourths of an inch, and the more exact instruments in thousandths of an inch with charts to give you conversions to sixty-fourths and multiples thereof. Since you will have to measure with these tools, it would be desirable to have dimensions which tend to come out in sixty-fourths or multiples thereof.

It is probable that your first model will be built from commercial parts, which have accompanying drawings that have already been reduced to more or less standard dimensions. However, some day you may wish to plan a locomotive of your own and will have to work with these conversions. In building a working steam locomotive you will have to use thousands of dimensions and it is a great time-saver if you are able to work with standard measurements.

Theoretically, a model can be built to any proportion. The electric drive model railroaders mix English and metric units with apparent ease, and lately have been using only the proportion, as "O" gauge is 1/45. This is acceptable where commercial parts are widely used, but has disadvantages where each person has to make the computations. Much of the confusion in modeling has been inherited from our British cousins who not only started the idea of model railroading, but got off on the wrong track by assuming (for modeling purposes) that track gauge was 60 inches rather than 56½ inches. This is

MATHEMATICAL ASPECTS OF SCALE AND GAUGE

Gauge								
Inches = 1'0"	Inches = 1"	Scale 24"	Scale 36"	Scale 56-1/2"	Common Variations	Square Feet = 1 Scale Acre	Pounds = One 2000 lb. ton (Scale Tons)	Conversion Factor*
1	2	3	4	5	6	7	8	9
1/4	1/48	1/2	3/4	1-17/96	1-3/16 (57), 1-1/4 (60)	18.9	.0181	.000016
3/8	1/32	3/4	1-1/8	1-49/64	1-3/4 (56)	42.5	.061	.00004?
1/2	1/24	1	1-1/2	2-17/48	2-1/2 (60)	75.6	.1447	.000108
3/4	1/16	1-1/2	2-1/4	3-17/32	3-1/2 (56)	170.1	.488	.000358
1	1/12	2	3	4-17/24	4-3/4 (57), 5 (60)	302.5	1.157	.000853
1-1/8	3/32 R	2-1/4	3-3/8	5-19/64	5-1/4 (56)	395.2	1.648	.00117
1-1/4	5/48 R	2-1/2	3-3/4	5-85/96	5-15/16 (57), 6 (57-7/8)	472.5	2.261	.00159
1-1/2	1/8	3	4-1/2	7-1/16	7 (56), 7-1/8 (57) 7-1/4 (58), 7-1/2 (60)	680.6	3.906	.00269
1-3/4	7/48 R	3-1/2	5-1/4	8-23/96	8-1/4 (56-1/2)	926.5	6.225	.00419
1-7/8	5/32 R	3-3/4	5-5/8	8-53/64	8-3/4 (56), 8-7/8 (56-3/4)	1,064.2	7.629	.00511
2	1/6	4	6	9-5/12	9-7/16 (56-5/8), 9-1/2 (57)	1,210	9.259	.00615
2-1/4	3/16	4-1/2	6-3/4	10-19/32	10-1/2 (56)	1,581	13.184	.00855
2-1/2	5/24	5	7-1/2	11-37/48	11-1/2 (55-1/8), 11-3/4 (56-3/8) 12 (57-7/8)	1,890	18.084	.0115
2-5/8	7/32	5-1/4	7-7/8	12-23/64	12 (54-3/4), 12-3/8 (56-5/8)	2,082	20.935	.01305
3	1/4	6	9	14-1/8	14 (56), 15 (60)	2,722	31.25	.01875
3-1/2	7/24 R	7	10-1/2	16-23/48	16 (54-3/4), 16-1/2 (56-1/2)	3,706	49.62	.0295
3-3/4	5-16 R	7-1/2	11-1/4	17-21/32	17-5/8 (56-1/2), 18 (57-1/2)	4,253	61.03	.0360
4	1/3	8	12	18-5/8	18 (54-1/2)	4,840	74.07	.0433
4-1/2	3/8 R	9	13-1/2	21-3/16	22 (58-5/8)	6,325	105.5	.0605
6	1/2	12	18	28-1/4		10,890	250.0	.0141

*Multiply actual weight of prototype by conversion factor to find approximate weight on model. This factor takes into account exact scale weight reduction and "solidity factor" or greater than scale weight of the model.

Aspects of Scale and Gauge

even more difficult to understand since there was never any 60-inch gauge in England, while there was a sizeable amount in this country.

As will be shown later, a model built to a 60-inch gauge has only about 83.5% of the bulk of a model built to the correct scale for the gauge of 56½ inches. If you are fussy about details, it might be sensible to stick to the scale whose normal gauge is a scale 56½ inches or at least 56 or 57 inches.

In the table, column 2 is a listing of fractions of an inch that are used by model makers in the building of model railroad equipment to represent one inch on the prototype. This is the scale, and it is also the proportion which is the newer concept. Since many are more accustomed to thinking in the terms of inches to represent a foot on the prototype, this figure is shown in column 1. Also note that these figures are arranged in two columns: one set being multiples of one forty-eighth of an inch and the other being multiples of one thirty-second of an inch. This was done because the thirty-second figures are easier to measure with conventional measuring instruments. The letter (R) after some scales indicates that these are rare, usually because they are near some more popular gauge.

Note: Other series are also possible. Countries with the metric system use series based on fiftieths or decimal proportions. These are not included because they are very rare in this country.

The table lists these scales in ascending order of size. Column 1 of this table is the length of a scale foot. Column 5 is the true scale gauge of 56½ inch gauge. Column 6 lists the commonly used variations in gauge and the prototype gauge each would represent. Column 4 is the true scale gauge of prototype 36-inch gauge, and column 3 is the true scale gauge of prototype 24-inch gauge.

Narrow gauge prototypes have become increasingly popular in recent years because of the quaint flavor of the equipment, and because a larger engine can be made to run on the same gauge track. Two other gauges are also used at times because they were used in the past for toy trains and some people have built steam engines for these sizes. A gauge of 2-1/8" was used for the old "standard" gauge trains, and 3-1/4" was used by the "Buddy L" push toys. These gauges are omitted from these tables because they are not common, and are useful only for the lone wolf with the desire to build his own track.

Several important considerations are yet to come. These are the things that make the real difference in the choice of scale. They are area and weight. Considering area, column 7 shows the square feet that would be representative of a scale acre. An acre is about 208 feet square, or to put it in railroad terms, a railroad could put 75 forty-foot box cars in an acre of yard track, assuming the standard 13-foot spacing of track. This becomes important when trackage is considered, as can be seen, the area required quadruples as the gauge doubles.

The final factors are weight and volume. They are perhaps of first importance as they affect four of the considerations used to judge the desirability of a scale.

1. Weight of locomotives and cars, and therefore, their portability.

2. Appearance of size. The human eye judges size by bulk rather than by linear dimension.
3. Cost. Many items such as castings are priced in part by the weight of metal in them.
4. The hauling ability. This concerns both the tractive force of the locomotive which is limited by the weight of the locomotive and the hauling capacity of the cars.

Column 8 gives the weight in pounds of a scale ton of prototype in each scale. Column 9 gives a conversion factor to reduce the known weight of a prototype locomotive to an estimated weight. This figure is compounded of two factors: the mathematical ratio of weight as used to find the "scale ton" and the solidity factor. Full-sized equipment is lightened in many ways that the modeler cannot use, such as coring out or making the castings partly hollow and use of plate steel that would be extremely thin if reduced according to exact scale. This factor can best be determined by experience, but it varies from about 150% for 2½-inch gauge to 120% for 14-1/8 inch gauge. This solidity factor is almost always working in the right direction for the modeler, as will be discussed later. The scale ton is not influenced by the solidity factor, as it is used for such things as loads.

Example: A New York Central class J-3a Hudson weighs 340 tons, engine and tender. What would a 3½-inch gauge model of this engine weigh?
Take 680,000 lb. and multiply it by the conversion factor for 1/16 proportion (3½-inch gauge). 680,000 x .000358 = 243 lbs. approximately.

Example: How much gravel would a 7/32 scale (12-3/8 inch gauge) model of a fifty-ton hopper car hold, loaded to the same level as the prototype?
Take 50 tons and multiply it by the weight of a scale ton in 7/32 scale.
50 x 20.9 = 1045 lbs.
Note that the solidity factor is not used here because we are comparing exact scale volumes of an identical material. The car would be heavier than scale, the load is not.

If your choice turns to the larger gauges, do not let the weights scare you too much, as no one expects these to be portable, and the greater hauling capacity has many advantages under proper circumstances. They are not, as a rule, one man operations unless the person is wealthy. Also, larger gauges seem to be more popular as complete railroads rather than locomotives and test track only, which seems to be the case with the four smaller live steam gauges.

Random notes on choice of gauge:

1. 7-inch gauge (7-1/16, 7-1/4, 7-1/2) seems to be the transition gauge. That is, it seems to be both the largest small gauge and the smallest large gauge. It is used in both types of operations, the locomotive and club test track, and the complete railroad at one location. It is the smallest gauge that seems to always be laid on the ground (not on trestles), and the largest that has portable locomotives.
2. The growth of larger gauges has probably been in part due to the growing popularity of older engines. Few people really realize the tremendous difference in weight between an 1870 4–4–0 and a modern 4–8–4: the Northern weighs almost four times as much and often more than four times as much. Thus, a Northern in one gauge would weigh about as much as a 4–4–0 in a gauge that is more than 50% wider.
3. For standard gauge prototype, gauges smaller than 10½ inch (scale 56") cannot "build themselves" in the sense that they cannot haul the material to build their own grades. The smaller gauges can haul some material for ballast and clean-up, but most "grading" is done with wheel barrows or small construction equipment. This is not a disgrace, as most full-size railroad grading now is done with off-track equipment.
4. Prototypes with trailing trucks are probably better, because most model locomotive fireboxes are small enough as it is without having to cramp them between the drivers. However, this statement is like the remark often heard about it being better to build a large gauge model of a small locomotive than a small gauge model of a large locomotive. This is a matter of taste and many people would rather not build a locomotive unless they could build an articulated.
5. Passengers can sit two abreast on 12" gauge (scale 54-5/8), and it would seem to be quite difficult to do this in any smaller gauge.
6. Standard pipe sizes are more to scale in the larger gauges, although "scale" pipe is available.
7. One should not decide to build in any scale until he has been to several meets or until he has built wooden "mock-ups" in several sizes to really see and understand just how big his project will be.

The process of building a scale model works with the modelmaker in many ways, some of which would require extensive explanation in regard to formulas for bending of axles, bearing areas, buckling of columns (main rods), and other strength of material considerations. As the scale is reduced, the model becomes stronger than the prototype and there is no real reason to "design" a model. It will be able to operate correctly if one just copies the prototype dimensions with the exceptions stated in the following paragraph.

The three exceptions to simply scaling down a prototype are the passengers, the boiler, and the bore of the cylinders.

1. The passengers. As the scales get smaller, the scale ton weight of the passengers gets larger. In 3½ inch gauge, a 200-pound passenger or operator weighs 410 scale tons. Some allowance must be made in things like car floors, tender and car axles, etc. for this fact.
2. The boiler cannot just be scaled down because corrosion does not scale down, and water needs just as much space to flow in any scale. This does not mean that the passages have to be as large as the prototype, but it does mean that they usually have to be larger than scale. The boiler plate must also be thicker to counteract even minor corrosion.
3. The master of the boiler of the cylinders of locomotive to 1/8th scale will be only 1/184th as heavy as the prototype, even considering the solidity factor, but if it had the same cylinder dimensions and boiler pressure as the prototype, it would have 1/64th the tractive effort. Since the gripping effect on the rails is due to weight alone, the engine would be "slippery." The boiler pressure is usually reduced in models, but one must remember and also reduce the bore of the cylinders to have about the same ratio between tractive force and weight drivers as the prototype.

Oh yes, that comment about the relative size of a model to the true scale for the gauge and one where the gauge would be a scale sixty inches. If one takes the ratio of one over 56½ cubed to one over 60 cubed, you will see that the ratio of these two numbers shows that the model built to the overly wide gauge would only have 83⅓% of the bulk of the model built to the correct gauge.

PART ONE

SHOP SAFETY PRECAUTIONS

SO YOU WANT TO BUILD A LIVE STEAM LOCOMOTIVE

CHAPTER 7

by Joseph F. Nelson

It is to be realized that a large percentage of people building Live Steam locomotives are using machine tools for the first time; and, since many of them have had no previous experience in the machine shop, they are totally unaware of the hazards involved. This section on shop safety is based upon the safety instructions used in machine shop classes of the Los Angeles City High Schools, Adult Schools, and Technical Colleges. They were compiled by a group of vocational machine shop instructors (the author being one) who had many years experience as machinists and/or tool makers before they could qualify for a California State Teaching Credential. It is hoped that the novice will go over the following safety precautions carefully. Usually he is working alone and does not have the benefit of safety supervision by an experienced machinist or an instructor, without which he could blunder into a serious accident.

GENERAL SAFETY

Visitors or friends should not be permitted to work on any machine or equipment since, in most states, the shop owner is liable for injury.

If guards or safety devices are removed for any reason, they should be replaced before operation is continued. Visitors have a knack for pointing at revolving gears and cutters—Whoops! There goes a finger!

Machinery must never be oiled, cleaned, or adjusted while in motion. Some part of your body, clothes, or equipment may get caught by the machine.

If one is engaged in any activity where eye hazards such as flying particles, corrosive substances, or blinding light exist, goggles or a face shield should be used.

Rags containing oil, paint, etc. particularly linseed oil, should be put into covered metal containers to guard against spontaneous combustion.

Any liquid or grease spilled on the floor should be wiped up immediately to eliminate the possibility of fire when using the torch, and slips and falls.

Don't lift anything more than your ability to handle it easily. Squat down when lifting heavy objects. Use the leg muscles and attempt to keep the back vertical. This procedure will prevent a rupture or a spine injury.

Long pieces of material should be handled so that they will cause no damage to property or injury to others. Carry the forward end above head height.

Do not place articles on window sills, stepladders, or high places where they may fall and cause injury. Never throw anything out of a window.

In case of accident, however slight, take care of it at once. Infection may result from uncared-for cuts and scratches.

Keep your mind on your work—a lapse of attention may mean a serious accident.

Make certain that visitors are clear of the machinery before turning on the power or while the machine is in operation. Also, keep neighborhood kids and nosey adults out of the shop while you are operating machinery. The novice can't answer stupid questions, watch a couple of kids and keep his mind on his work at the same time; neither can the professional, for that matter. Be antisocial!

When shutting off a machine, stay with it until it has come to a dead stop.

Before starting to work, remove rings, watches, neckties, and sweaters. Roll sleeves above the elbows and tuck in loose clothing. These precautions will prevent them getting caught in the machine. Also, metallic jewelry can cause shorts when working on electrical systems (6 volts and up), and a serious burn can result.

Never use gasoline for parts cleaning since a pilot light can ignite the vapor or the innocent smoking of a cigarette can cause an explosion. Use cleaning solvent, kerosene or Diesel fuel for cleaning. They are flammable, but not explosive.

When cleaning with air (blowing off chips, cleaning engines, etc.) direct the air nozzle away from and not toward anyone. An eardrum may be broken, foreign material can be blown into the eyes, the intestines can be exploded by an air blast at the navel or rectum.

Never run a gasoline engine in a closed room or garage. Monoxide gas is deadly.

If you want to live longer, prevent accidents and enjoy your hobby!

Do not wear gloves when operating power machinery. They get caught.

HAND TOOLS AND BENCH WORK

Keep handles of tools free from oil or grease so that they will not slip.

Striking two hardened pieces of metal together will cause chips to fly which may strike someone. For example: striking two hammers together or a file against a metal vise.

Mushroomed heads on chisels, hammers, punches, and similar tools should be ground off before the tools are used. Flying particles loosened by a shock on the ragged edge of a mushroomed head may cause painful injury. Remember: you may eat with false teeth and work with a wooden leg, but you can't see with a glass eye!

Wrenches with badly worn and sprung openings should not be used since they will slip and cause hand injury.

All files should be fitted with tight handles to prevent injury by the tang.

Keep both hands in back of the blades of the screwdriver and scraper. When using a knife, diagonal pliers (dykes), or other cutting tools, cut away from yourself and stand clear of others.

To prevent your work from slipping out of your vise and possibly falling on your feet, keep your vise securely clamped, short of distorting your work.

Tools and materials should not be left protruding from a vise or work bench.

Keep tools sharp at all times—dull tools are dangerous. Don't be the victim of hand and finger lacerations by careless handling of sharpened tools. When passing a sharpened tool to someone else, extend the handle toward the other party.

BENCH GRINDER, WIRE WHEEL BRUSH, AND BUFFING WHEELS

In all instances when using the bench grinder, wire wheel brush, or buffer, be fully covered by eye insurance by using the face shield or making use of the "over the wheel guard."

Work rests on bench (or tool grinders) must be adjusted as close to the wheels as possible to prevent the work from jamming between the rest and the wheel. The gap should not exceed 1/64". The work rest must be securely clamped after each adjustment. Never hold the work or tool downward between the wheel and the rest when grinding, since jamming will result in possible bodily injury.

Use particular caution when grinding work that is held in the fingers so as to prevent the work from slipping from the fingers and wedging between the wheel and guard; perhaps breaking the wheel and causing injury.

Heavy grinding on one side of the wheel is dangerous and may break a wheel.

Buff or wire brush work below the horizontal axis of the wheel; otherwise, the wheel may grab the work and throw it around the shop.

Stand to one side and out of line of flight when a grinding wheel is being faced or started up for the first time. The wheel might possibly have residual cracks and could explode under the centrifugal force.

Small pieces of material being ground should be held with vise grips to prevent the work from slipping and jamming the wheel.

DRILL PRESS

Use the drill press vise or clamp to hold work being drilled. This procedure will prevent the drill from grabbing and throwing the work across the shop.

Grip or clamp the vise firmly when you are drilling, and ease up on the feed pressure as the drill breaks through the work. This will decrease the chances of the drill grabbing the work as it breaks through and revolving it.

If a drill does grab a piece of work, causing it to revolve, stop the drill press immediately. It is dangerous to grab the work when it is revolving.

Always use a sharp drill ground for the right material since improperly ground drills can grab and throw the work. Stop the drill press before attempting to remove work or chips. Use a brush to remove the chips.

Remove the chuck key from the chuck or the drift from the spindle before turning on the power. This will prevent them from flying when the drill press starts.

ELECTRIC HAND DRILL

Make certain that the drill switch will not be turned on accidentally while the drill is being tightened in the chuck, or the key may become entangled in the clothing and cause personal injury.

Extension cords should be laid out so as to avoid the hazard of anyone tripping over them when moving about the shop. Arrange the extension cord directly from the wall socket to the floor. An inspection of the cord and plug should be made and the insulation should not be abraded or in poor condition. Wherever possible, have the modern 3-pin connectors on extension cords. Where the 3-pin connector boxes are not installed, purchase 3-pin-to-2-pin adapters and ground the third wire.

Do not stand on a wet floor and make certain that hands are dry before touching electric drills and switches; otherwise a burn or fatal shock could result.

Where a helper is applying pressure on a drill with a "Joy Stick" or "Old Man," the person holding the drill should operate the switch.

Keep face away from drill motor handle. When a drill grabs, the handle is liable to swing around and strike the operator in the face.

LATHE

Care must be taken when turning bar material that extends beyond the end of the lathe. It must be supported in a manner to prevent it from whipping. In addition, tie a rag marker to the end of the bar to warn other people.

When setting up work on centers, the tail stock must be securely clamped and the work revolved through one complete turn before turning on power.

Chuck blocks or some other sort of support should be used when mounting or removing the chuck from the spindle to prevent dropping the chuck on fingers or feet.

To prevent hand injury, the revolving work should never be touched by the hands, wiped with a rag, encircled with a piece of emery cloth, or measured.

The gear cover should be kept closed while operating the lathe to prevent hands or clothes from being caught in the moving parts.

To prevent injury to hand or arms, remove the tool from the tool holder and move the carriage toward the tailstock before filing or polishing.

Remove chuck key or wrench from chuck immediately after use to prevent its flying out when the machine is started, since it may strike someone.

Always be alert to stop the power feed before the tool reaches the chuck jaws to prevent the tool from hitting the chuck jaws and possibly breaking and flying or digging in and ruining the job.

Lathe chips are hot and sharp and they will burn and cut. Use a brush for, small chips and pliers or hook for long chips. Stop the machine while cleaning.

MILLING MACHINE

Securely fasten all clamps and fixtures before turning on the power to prevent the work being thrown off the table when the milling cutter enters the work.

Before turning on power, disengage all clutches and feeds. This will prevent unexpected cutter or table movement when the starter button is pressed.

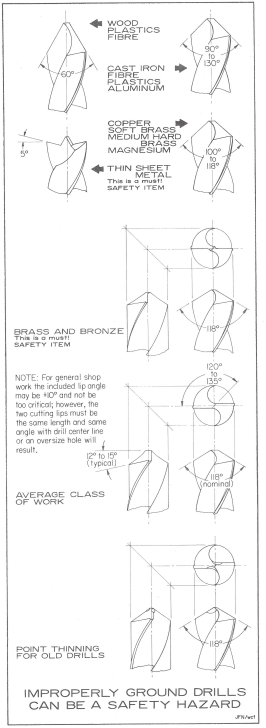
Only tighten or loosen the arbor nut when the over arm is supporting the end of the arbor. Never use power to tighten or loosen the arbor nut since this may spring the arbor and throw the wrench and possibly cause physical injury.

To prevent someone from slipping when oil or cutting compound is spilled on the floor, cover it with sawdust and clean it up immediately.

Stop the cutter to take measurements. Tools or clothing may become caught by the cutter and be dragged in and an arm or hand could then be badly mangled.

In no event should one have hands within eight inches of a revolving cutter (pointing at the work); otherwise, in a moment of inattention, hands may be caught by the cutter and be dragged in, resulting in a possible amputation.

When any machine is cleaned by blowing off the chips with compressed air, make certain that a face shield or goggles are worn. Safety glasses are not 100% safe in this case since sharp chips are flying at all angles and can enter the eyes from the sides which are protected by goggles and face shield, but not safety glasses.



SHAPER

The shaper ram and tool must be checked before starting the shaper to make certain that the tool or ram clears the table or work.

Stop the shaper and shut off the power when setting up or changing the tool, since many major accidents have resulted from not adhering to this practice.

Check the starting lever for neutral before pressing the starting switch.

Keep hands away from cutting tool and body away from line of ram travel.

Remove all wrenches from the shaper after the set-up has been completed to prevent them from falling on the feet or getting caught by the tool or ram.

Safety glasses should be worn when operating any shaper or planer. Also, don't stand directly in front of the machine or lean over the work while the machine is in motion, since this will prevent getting hit in the face by hot and sharp clips.

Do not shift the moving belt since it may pull an arm into the cone pulley.

ACETYLENE TORCH

Keep flammable liquids away from the soldering and welding area and have an approved fire extinguisher fully charged in the immediate vicinity.

Chain oxygen and acetylene tanks to the wall to prevent them getting knocked over and having the valve knocked off—they take off like a ballistic missile!

Always shut off tanks first, then release line pressure and finally regulators.

Do not oil regulator screws! Oil and oxygen will ignite without a spark.

When welding or silver soldering, always wear eye protection against sparks.

When someone else is in the immediate vicinity, be careful how the torch is handled. A third degree burn takes a long while to heal.

When using the cutting torch, don't blow molten slag on a cement floor. The expansion of the cement (or concrete) under the molten slag will cause the concrete to explode and leave a crater in the floor, and incidentally, someone could get clobbered with a piece of concrete. No reasons will be given here why cutting shouldn't be done on a wood floor since, if some "headless horseman" will blow molten slag on a wooden floor, he is too dumb to build a locomotive! Cover the cement floor with a sheet of steel where the slag will fall.

POWER SAW

Stand to one side of the saw frame when the saw is started since a misjudgment of the saw frame travel could cause a painful injury.

Place work in the vise only when the saw is stopped.

Do not bend over the saw frame while the saw is operating since on most power saws, the frame is released when the cut has been completed and it may hit you.

Support long stock on saw horses so that when the piece is cut off, it won't fall on someone's foot, or work loose in the saw vise and break a blade.

Tighten the saw vise securely and keep the saw blade taut. This will prevent the breakage of saw blades.

Under no condition leave stock laying on the floor. A person will slip on or trip over flat or rectangular stock; however, round stock is in a class by itself—it's a killer!

SAFETY FIRST is not a slogan.
It is RULE ONE in Live Steam!

PUGET SOUND LIVE STEAMERS SPRING MEET

The railroad meet of the Puget Sound Live Steamers at Marysville, Washington, on July 9th turned out to be a most successful event. About 150 attended and engines operated from 1:00 until 8:00 p.m. carrying passengers continuously. The 1" and 1½" track travels 1000 feet through tall fir trees . . . a setting second to none, and Larry Griffin ran his 12" gauge equipment on a temporary track laid for the occasion.

Hosts for the Railroad Meet of the Puget Sound Live Steamers were Bill Steinhauer, Dennis Riches and Alan VonRueden. The PSLS includes all phases of Live Steam in their membership including a flotilla of steam-powered boats. With the adequate loading and unloading facilities that they have available, it sounds as though their discussions of an annual meet in the Northwest would be one that many Live Steamers would look forward to!

SIXTH ANNUAL WINTER WORKSHOP

March 30th turned out to be a rainy day but it didn't dampen the spirits of 70 Live Steamers who attended Matt Fairlie's Sixth Annual Winter Workshop in Markham, Illinois.

They came from near and far . . . including Green Bay, Wisconsin; Detroit, Michigan; Cedar Rapids, Iowa; LaSalle area Illinois; South Bend Indiana and Buchanan, Michigan, as well as from the Chicago area.

Matt's garage was a bee-hive of activity with more than 30 locomotives and 10 stationary engines on display . . . swarmed over by Live Steamers inspecting and conversing.

Refreshments and movies of still-operating steam activities continued into the wee hours and the door closed behind the last Live Steamer at 3:00 a.m.!

It's a wonderful project that Matt sponsors for Live Steamers and one that is greatly appreciated by all.

CMEA HOLDS 1967 SHOW

The Museum of Science and Industry in Chicago was the scene of the second annual exhibit by the Chicago Model Engineers Association from May 6th through 14th, and a fine exhibit it was.

About three times as many exhibitors participated as in the previous year and a 100-foot stretch of ¾" track was set up on which Matt Fairlie's Atlantic operated each day. Air was piped from the building supply and many of the exhibits were operated on air for the spectators. Several of the members took a week of their vacations and tended the exhibit, assisted by Mrs. Holt and Mrs. Fairlie (wives of the President and Vice President) during the whole program.

LIVE STEAMERS ACTIVE IN MID-SOUTH

Live Steam is making good headway in the South with an impressive list of projects under way within the ranks of the Mid-South Live Steamers.

Three members have locomotives in the planning stage including 2–6–0, 4–8–4 and 4–6–2 types and an 0–4–0, an 0–6–0 and a Climax are under construction. Four of these six engines are Nashville based projects.

Joe Ed Gaddes of Route 5 Lipscomb Drive, Franklin, Tennessee 37064 is Secretary and Treasurer of the Mid-South Live Steamers and anyone interested in joining in the activities of that group can get additional information by contacting him.

PROGRESS REPORT FROM LONG ISLAND: LIVE STEAMERS HARD AT WORK!

The newly-organized Long Island Society of Model Engineers reports a growing list of enthusiastic members meets twice a month and that several members have locomotives under construction including a "Tich," "Virginia," etc. The Club's locomotive project is well along with frames, wheels, axles and cylinders machined for an 0–4–0, and some progress has been made towards acquiring a track site.

For more information about Live Steam activities on Long Island contact Tom Overslaizen, Secretary (412 South Country Road, East Patchogue, N. Y. 11772, phone 516–289-3023), or W. E. Wilson, Publicity Chairman (118 Magnolia Street, Westbury, L. I., N. Y. 11590).

Scheduled Meets

SEPTEMBER

2 PENNSYLVANIA LIVE STEAMERS
3 Annual Fall Meet
4 2½" – 3½" – 4½"
Frank H. Moore, Jr., Secretary
211 Walnut Street
Wayne, Pennsylvania 19087

9 GOLDEN GATE LIVE STEAMERS
10 Annual Fall Meet
2½" – 3½" – 4½" – 7½"
Joseph W. Bryan, Secretary
1225 Scott Street
El Cerrito, California 94530

15 NEW JERSEY LIVE STEAMERS
Annual Fall Meet
17 3½" – 4½" – 7½"
Ralph Green, Secretary
845 Kilsyth Road
Elizabeth, New Jersey 07208

30 LOS ANGELES LIVE STEAMERS
1 Annual Fall Meet
W. Ross Crawford, Secretary
6900 Royer Street
Canoga Park, California 91304

OCTOBER

1 5th ANNIVERSARY RUN
4½" Gauge
James L. Banning
3333 Kahawalu Drive
Honolulu, Hawaii 96817

12 PIONEER VALLEY LIVE STEAMERS
13 Annual Fall Meet
14 3½" – 4½" – 7½"
15 Brenton W. Bonfanfaher, Secretary
3 Fleetwood Drive
Sandy Hook, Conn. 06482

REGULAR RUN DAYS

GOLDEN GATE LIVE STEAMERS
Every Sunday, Weather permitting
2½" – 3½" – 4½" – 7½"
Joseph W. Bryan, Secretary
1225 Scott Street
El Cerrito, California 94530

LOS ANGELES LIVE STEAMERS
1st Saturday & Sunday each month
3½" – 4½" – 7½"
W. Ross Crawford, Secretary
6900 Royer Street
Canoga Park, California 91304

NEW JERSEY LIVE STEAMERS
1st and 3rd Sundays each month
3½" – 4½" – 7½"
Ralph Green, Secretary
845 Kilsyth Road
Elizabeth, New Jersey 07208

PENNSYLVANIA LIVE STEAMERS
2nd Sunday each month, May thru Oct.
2½" – 3½" – 4½"
Frank H. Moore, Jr., Secretary
211 Walnut Street
Wayne, Pennsylvania 19087

SOUTHERN CALIFORNIA LIVE STEAM CLUB
3rd Sunday of each month
3½" – 4½" – 7½"
K. G. Kepner, Secretary
2764 Maple
Rialto, California 92376

WABASH, FRISCO & PACIFIC ASSN.
Every Sunday – 12" gauge
George F. Kiesel, Jr.
6347 N. Rosebury Avenue
St. Louis, Missouri 63105

NORTHERN ILLINOIS LIVE STEAMERS ELECT OFFICERS

After only six months of preliminary preparation, the NILS group is in the process of incorporating with the following officers elected at the July meeting:

Matt Fairlie, President
Bud Novy, 1st Vice President
Mort Shine, 2nd Vice President
Bill Holt, Treasurer
Doc Youngdahl, Secretary
Al Schnieder, Board Member
Bill Schrieber, Board Member

All officers are members of the Board of Directors.

All local members will start out as "Associate Members" and only those who prove themselves active in a year or so will be elected to "Regular Membership."

The club will welcome distant Live Steamers as "Affiliate Members" with dues of $3.00 per year for which they will receive monthly reports of progress and be eligible to bring locos to meets for reduced fees, etc.

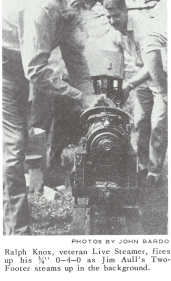
The Northern Illinois Live Steamers have an imposing objective: To build the biggest and best multi-gauge track in the country and to host National Meets. The entire hobby will benefit from these facilities and look forward to reports of their progress.

Don't Get Caught Napping!

JOE THOMAS

We wanted to use this candid shot of Everett Ryan of Greenwood, Massachusetts to remind you to check page 15 of your August issue to see if your subscription expired with that mailing. In the event that the semaphore at the top of that page is colored red and you have not already sent in your renewal, be sure to do so immediately so that we can continue sending LIVE STEAM your way each month. Joe Thomas of Ottawa, caught this pose at a recent New Jersey Live Steamers' meet while Everett caught 40 winks!

CINDER SNIFFERS MEET AGAIN



PHOTOS BY JOHN BARDO

Ralph Knox, veteran Live Steamer, fires up his 3/4" 0-4-0 as Jim Aull's Two-Footer steams up in the background.

A local Live Steam gathering at the home of Bob Maynard produced four engines under steam...one for the first time. This, incidentally, was the "Cinder Sniffers" first steaming since the loss of their club track in February.

Although the EGB & Pacific oval is only 200 feet, the enthusiasm of the members helped make up for the fact that only 3/4" scale 3½" gauge engines could operate.

Those present with engines were:

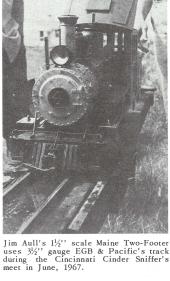
3/4" scale, 3½" gauge

Ralph Knox	0-4-0
Russ Conley	4-6-0
Bob Maynard	4-4-2

1½" scale, 3½" gauge

Jim Aull	0-4-4T

The Cinder Sniffers are working for land for the rebuilding of a combination ¾" and 1½" scale track. This type of track construction seems to invoke discussions pro and con: the operation of ¾" scale at ground level and the use of both sizes of equipment at the same time.



Jim Aull's 1½" scale Maine Two-Footer uses 3½" gauge EGB & Pacific's track during the Cincinnati Cinder Sniffer's meet in June, 1967.

SOUTHEASTERN LIVE STEAMERS HOLD SPRING MEET

Photos and Report by Sydney H. Watts

Bobby Thompson with his ¾" 4-6-4 (1) calls for passengers at the Southeastern Live Steamers' Spring Meet in Charlotte, North Carolina on May 20 and 21, 1967.

Live Steamers from Virginia, South Carolina, North Carolina, Georgia and Florida made this one of the largest Meets yet with several camping in trailers on the Club grounds. Mrs. J. E. Griffiths (left) and Mrs. Sydney Watts chat (2) in front of the Club's Seaboard caboose.

Henry W. Walter of Asheville, North Carolina built this ¾" scale 4-4-0 (3) with English castings as designed by LBSC about ten years ago. Complete except for grates, the engine shows meticulous workmanship with all present expressing the desire to see it finished and running at the next meet.

Al Butcher's ¾" scale Atlantic (4) with Marshall valve gear made its first run on a track at the Spring Meet. This type of valve gear is unique in model locomotive construction and provided a never-ending source of amazement during operation.

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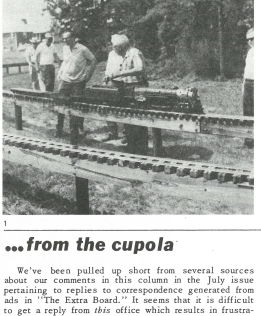

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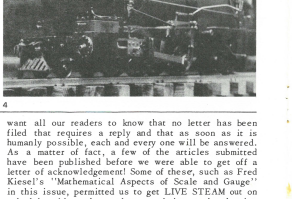

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...from the cupola

We've been pulled up short from several sources about our comments in this column in the July issue pertaining to replies to correspondence generated from ads in "The Extra Board." It seems that it is difficult to get a reply from *this* office which results in frustration at both ends of our line of correspondence! The past six months have been quite hectic, to put it mildly, what with first deciding whether or not we would be able to continue LIVE STEAM, and then covering nearly 10,000 miles in search of a place where we could live with less pressure. With that out of the way, there were commitments which needed to be fulfilled in addition to preparing LIVE STEAM for distribution each month. This is offered as explanation rather than excuse and we want all our readers to know that no letter has been filed that requires a reply and that as soon as it is humanly possible, each and every one will be answered. As a matter of fact, a few of the articles submitted have been published before we were able to get off a letter of acknowledgement! Some of these, such as Fred Kiesel's "Mathematical Aspects of Scale and Gauge" in this issue, permitted us to get LIVE STEAM out on schedule without the need to spend time at the drawing board.

As each packing box is emptied and order becomes evident, the task of catching up gets nearer to completion. It is not because of any disinterest or apathy that your letter or article has not been acknowledged, but keep watching the mail box...your reply will come soon!

—W. C. F.—

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WINCHESTER, INDIANA 47394

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Volumes V and VI Holtzapffels "Turning and Mechanical Manipulation." M. Mc Nally, 3913 Saratoga Avenue, Downers Grove, Illinois.

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1½" scale truck castings $40.00 per pair. Photo 25¢. Ben Nixon, 927 Woodland, Southampton, Pa. 18966.

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NEW LIST #6

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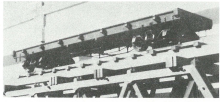

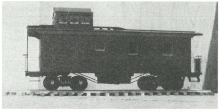

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